The python program based on FFT homogenization produces homogenized stiffness matrix from data obtained from nanoindentation.

The program is composed of couple of python files with the main file named "main.py" and can be launched in linux operating systems by command "python main.py".

The program itself is composed of a window with three tabs shown on following figures.

The tab "indendation" produces the input file for FFT homogenization.

- Input data from nanoindentation
 - Info file the name of results file obtained from nanoindentation, e.g. "K1-1#1.results.TXT"
 - Update read Info file
- Data from input file the data read from Info file
 - No. of discretization points the number of discretization points in x (vertical) and y (horizontal) directions
 - Size of PUC the size of periodic unit cell
 - Discretization step the size between two adjacent points in each direction of regular grid
- Creation of input file creates the input file for FFT homogenization
 - Name of input file the name of input file
 - Make input file makes input file for FFT homogenization

8	241		Homogenizat	tion					
ndentation	FFT Hom	nogenization	FFTH Postproce	ssing		3			
Input data Info file:	from nanoindentation								
	K1-1#1.re		Browse						
Data from	input file								
No. of dis	cretizatio	n points: 0.0		0.0					
	Size	of PUC: 0.0		0.0					
0	Discretizati	on step: 0.0		0.0					
Creation of	f input file								
Name of	input file:	input.txt				Browse			
	Make input file, (Calc			e, (Calculate,	Postprocess)				

The tab "FFT Homogenization" produces the homogenized stiffness from input file

- Inputs for FFTH homogenization
 - Input file the name of input file in a format as e.g. "input.txt", the preset value consist of the name from the tab "Indentation"
 - Tolerance for convergence tolerance for convergence, the required norm for residual of linear system
 - Maximal no. of iterations maximal number of iterations for the conjugate gradient algorithm
- Calculation
 - $^\circ \ \ calc_output_file$ the name of output file for a data from FFT homogenization
 - ° Calculate the button firing the FFT homogenization

8	Homogenization									
Indentation FFT Homogeniza	tion FFTH Postprocessing									
Inputs for FFTH homogenization										
Input file:	input.txt	Browse								
Tolerance for convergence:	0.0001									
Maximal no. of iterations:	1000.0									
Calculation										
calc_output_file: output.txt										
Calculate, (Postprocess)										
		3								

The tab "FFT Postprocessing" postprocess the data obtained from the FFT homogenization

- Postprocessing file
 - Postprocess file the name of output file from the FFT homogenization in a format as e.g. "output.txt", the preset value consist of the name from the tab "FFT Homogenization"
 - \circ Update read the data form postprocess file and shows it in "Outputs" group
- Outputs
 - Effective stiffness Effective (homogenized) stiffness in Mandel's notation obtained from FFT homogenization
 - No. of iterations number of iterations used for calculation for the unit loading
 - Residual norm residual norm achieved during iterations for particular unit loadings

3				Homogenization			
Indentation	FFT Homogenization		zation	FFTH Postprocessing			
Postproces	sing	file					
Postproc file: output.txt					Browse		
			update				
Outputs							
Effective stiffness (Mandel notation):		a stiffeese	0.0	0.0	0.0		
		0.0	0.0	0.0			
		0.0	0.0	0.0			
No. of iterations (kit):			0	0	0		
Residual norm (resnorm):		0.0	0.0	0.0			
					4		